

COMMUNITY STRUCTURE OF DANDACHALI FOREST OF TEHRI FOREST DIVISION, NORTH-WEST HIMALAYA

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Abstract: The present investigation was conducted in Dandachali forest of Tehri Forest Division, North-Western part of Himalaya. Surveys and sampling of the vegetation were done using standard ecological assessment methods with an aim to study plant species composition and natural regeneration status at community level. Forty seven woody species (17 trees) belonging to 12 families and 15 genera, and 6 forest communities viz., *Pinus roxburghii- Quercus leucotrichophora* mixed, *Pinus roxburghii, Pinus roxburghii- Rhododendron arboreum* mixed, *Cedrus deodara- Pinus wallichiana* mixed, *Cedrus deodara- Rhododendron arboreum* mixed and *Rhododendron arboreum- Quercus leucotrichophora* mixed, have been recorded in 16 sites between 1482- 2200 m asl. Among the communities, total tree density ranged from 263.34-1493.33 Ind ha⁻¹, TBA 260.2- 310.7 m² ha⁻¹ and total shrub density 488.3- 4250 Ind ha⁻¹. Species diversity (H') for trees ranged from 0.58-1.89. Concentration of dominance (cd) of trees ranged from 0.20-0.76.

Keywords: Survey, Tehri Forest Division, North-West Himalya

INTRODUCTION

The Phytosociological characters express the quantitative information on analytical characters, composition and pattern of distribution of the species (Saxena, 1982; Ralhan *et al.*, 1982; Sharma and Kumar, 1992). In a forest ecosystem, all plant species are not equally important but there are only a few overtopping species which by their bulk and growth modify the habitat and control the growth of other species of the community as these species are called dominants (Gaston, 2000). Therefore, phytosociological studies are essential for protecting the natural plant communities and biodiversity as well as understanding the changes experienced in the past and continuing on into the future.

The plant diversity and regeneration status of particular forests is baseline information for the management and conservation of biodiversity. Regeneration studies are important in view predicting structure and composition of the species. Regenerating forests can be characterized by presence of seedlings, saplings and trees of different age groups, from young to old (Chauhan, 2001, Chauhan *et al.*, 2001). regeneration status of tree species based on the age and diameter structure of their population (Khan *et al.*, 1987; Bhuyan *et al.*, 2003).

Study area

The study was carried out in Dandachali forest of Tehri Forest Division, Tehri Garhwal (district), Uttarakhand (State) part of North West Himalaya. Tehri Forest Division covers 143268.90 ha total forest areas, situated between latitude N-30°-03'05" and 30°-52'077" and longitude E-78°-56'35" and 79°-02'45". Tehri Range of the division lies between 30°-22'077" North latitude and 30°-25'599" East longitude which covers 16144.70 ha area. Lohital beat of this range covers 1117.30 ha area, comprises

of 14 compartments. Out of 1332 Vanpachayats in Tehri district, 273 Vanpachayats are included in Tehri Forest Division.

METHODOLOGY

Selection of Sites and Habitats for Vegetation

Sampling: Sites were selected on each and every accessible aspect along an altitudinal gradient. The habitats were identified based on the physical characters and dominance of the vegetation. Sites having closed canopy with high percentage of humus and moisture were considered as moist habitats whereas low percentage of the same as dry habitats.

Assessment of the Forest Vegetation: In each site, a plot of 50x50m (0.25 ha) was laid. Trees, saplings and seedlings were sampled by randomly placed 10, 10x10m quadrats and shrubs by 20, 5x5m quadrats. For the collection of data from these quadrates standard ecological methods (Curtis and McIntosh, 1950; Grieg-Smith, 1957; Kersaw, 1973; Muller-Dombois and Ellenberge, 1974; Dhar *et al.*, 1997; and Samant and Joshi, 2004) were followed. The circumference at breast height (cbh at 1.37m from ground) for each tree individual was recorded. Based on cbh, the tree individuals were considered as tree (cbh ≥ 31.5 cm).

Data analysis and Formulae used: Data analysis has been done following standard ecological methods (Curtis & McIntosh, 1950; Grieg-Smith, 1957; Kersaw, 1973; Muller-Dombois & Ellenberge, 1974; Dhar *et al.*, 1997; and Samant and Joshi 2004).

Species diversity: Species diversity (H') was determined by Shanon Wiener's information statistic (Shanon and Weiner, 1963). Diversity is usually considered as a function of relative distribution of individuals among the species. Shannon-Weiner

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information index (Shannon and Wiener, 1963) was used for estimating the diversity.

$$H = - \sum (N_i/N) \log_2 (N_i/N)$$

Where, N_i is the total number of individuals of a species and N is the total number of individuals of all species in that stand.

Concentration of dominance (Cd): Concentration of dominance (Cd) by Simpson's Index (Simpson, 1949). The index of dominance (C) of the community is calculated by Simpson's index (Simpson, 1949);

$$C = (N_i / N)^2$$

Where, N_i is the total number of individuals of species and N is the total number of individuals of all species.

RESULT AND DISCUSSION

Total of 16 sites were surveyed in the area. A total of 17 species belonging to 12 families and 15 genera were recorded in the study area (Table 6). Family Pinaceae dominated with maximum number of species (3 spp.) followed by Cornaceae, Ericaceae, Fagaceae and Symplocaceae, (2 spp., each (2 spp., each). All other families had only one species. Dominant genera were Quercus, Pinus and Symplocus (2 spp., each), followed by all other genera is single were represented in all sites (16 sites) followed by *Lyonia ovalifolia* (15 sites), *Rhododendron arboreum* (12 sites) and *Pyrus pashia* (10 sites). Dry degraded habitat was the richest in number of species (15 spp.) followed by dry degraded (12 spp.) and shady moist (10 spp.). A total of 6 forest communities were delineated in the study area. *Pinus roxburghii* community represented in maximum sites (#6), followed by *Cedrus deodara* - *Rhododendron arboreum* mixed and *Pinus roxburghii* - *Rhododendron arboreum* mixed (#3, each), *Cedrus deodara*- *Pinus wallichiana* mixed (#2) and *Pinus roxburghii*- *Quercus leucotrichophora* mixed and *Rhododendron arboreum* - *Quercus leucotrichophora*- mixed (#1, each).

Community composition, Structure and Regeneration pattern: Community wise total density, total basal area (TBA) and IVI of tree species and relative density of shrubs have been presented in Table 2, 3, 4, and 6, respectively.

***Pinus roxburghii*- *Quercus leucotrichophora* mixed**
The physical characteristics of the community have been presented in Table 2) 1. This community has been represented only in 1 site.

Community and structure: A total of 17 species (trees: 2) were recorded in the community. Total tree density and total basal area were 380.00 Ind ha⁻¹ and 296.42 m² ha⁻¹, respectively (Table 2, 3). *P. roxburghii* (Density: 220 Ind ha⁻¹, TBA: 174.28 m² ha⁻¹ and IVI: 166.69) was the dominant tree species, associated by *Q. leucotrichophora* (Density: 160 Ind ha⁻¹, TBA: 122.14 m² ha⁻¹ and IVI: 133.31). Similar

study was conducted by Singh *et al.* (1994) at Nainital Forest Division where maximum TBA (70.90 m² ha⁻¹) was found in pine dominated forest at 1850m and minimum in oak dominated forest at 1650m elevation. Ahmed (2012) conducted a study in Kumaon Himalaya where *Q. leucotrichophora* was found dominant in terms of density (183.2 trees/ha), mean basal area (625.3 Ind ha⁻¹) and IVI (99.9).

Pinus roxburghii

The physical characteristics of the community have been presented in Table 1. This community has been represented in 6 sites.

Community and structure: A total of 17 species including trees (6 spp.) were recorded in the community. Total tree density, TBA and IVI were 263.33 Ind ha⁻¹ and 310.74m² ha⁻¹, respectively (Table 2, 3). In which *P. roxburghii* (Density: 228.33 Ind ha⁻¹, TBA: 309.85 m² ha⁻¹ and IVI: 271.57) was the dominant tree and associated by *M. esculenta* (Density: 11.67 Ind ha⁻¹, TBA: 0.62 m² ha⁻¹ and IVI: 10.60) and *Lyonia ovalifolia* (Density: 11.67 Ind ha⁻¹, TBA: 0.21 m² ha⁻¹ and IVI: 8.95). Similar results were observed by Singh *et al.* (2014) at Nainital Forest Division. He noted maximum TBA (70.90 m²/ha) in pine dominated forest at 1850m elevation and minimum in oak dominated forest at 1650m elevation. Gurarni *et al.* (2010) recorded maximum total tree density (1000 tree /ha), TBA (14.55 m²/ha) in mixed pine-oak forest compared to pine dominated forest.

***Pinus roxburghii*-*Rhododendron arboreum* mixed**

The physical characteristics of the community have been presented in Table 1. This community has been represented only in 3 sites.

Community and structure: A total of 17 species (trees: 09) were recorded in the community. Total tree density and TBA were 980.1 Ind ha⁻¹ and 264.7 m² ha⁻¹, respectively (Table 2, 3). *P. roxburghii* (Density: 376.7 Ind ha⁻¹, TBA: 192.56 m² ha⁻¹ and IVI: 140.9) was the dominant tree and associated by *R. arboreum* (Density: 350 Ind ha⁻¹, TBA: 69.24 m² ha⁻¹ and IVI: 99.24) and *Lyonia ovalifolia* (Density: 63.3 Ind ha⁻¹, TBA: 1.14 m² ha⁻¹ and IVI: 18.88). Results of the present study showed higher density of tree and shrubs as compared to other studies like Rai *et al.* (2009) in Western Himalayas in case of *R. arboreum* and Rawat *et al.* (2014) in Govind Pashu Vihar National Park, Uttarkashi.

***Cedrus deodara*- *Pinus wallichiana* mixed**

The physical characteristics of the community have been presented in Table 1. This community has been represented only in 2 sites.

Community and structure: A total of 17 species (trees: 11) were recorded in this community. Total tree density and TBA were 795.0 Ind ha⁻¹ and 281.9 m² ha⁻¹, respectively (Table 2, 3). *C. deodara* (Density: 270 Ind ha⁻¹, TBA: 147.8 m² ha⁻¹ and IVI: 127.2) was the dominant tree and associated by *Pinus wallichiana* (Density: 190 Ind ha⁻¹, TBA: 55.41 m² ha⁻¹ and IVI: 60.12) and *R. arboreum* (Density: 115

Ind ha⁻¹, TBA” 35.17 m² ha⁻¹ and IVI: 33.4). These results are in line with Sharma and Raina (2013) in Jammu province of north-western Himalayas where the highest density, TBA and IVI values for *C. deodara* (675 Trees/ha, 72.80 m² /ha and 213.54) were recorded. Results are very similar to Singh and Samant (2010) in North Western Himalaya where total shrub density was highest in *C. deodara* (2611.7 Ind ha⁻¹) community.

***Cedrus deodara - Rhododendron arboreum* mixed**

The physical characteristics of the community have been presented in Table 1. This community has been represented only in 3 sites.

Community and structure: A total of 17 species including 13 species of trees (Table 6) were recorded in the community. Total tree density and TBA were 1493.33 Ind ha⁻¹ and 260.23 m² ha⁻¹, respectively (Table 2, 3). *R. arboreum* (Density: 516.67 Ind ha⁻¹, TBA: 90.69 m² ha⁻¹ and IVI: 96.83) was the dominant tree and associated by *C. deodara* (Density: 386.67 Ind ha⁻¹, TBA: 141.04 m² ha⁻¹ and IVI: 101.85) and *Lyonia ovalifolia* (Density: 153.33 Ind ha⁻¹, TBA: 2.00 m² ha⁻¹ and IVI: 20.45). As far as tree species are concerned, these results are in contradiction of Singh and Gupta (2009) in Western Himachal Himalayas. In this study, the Periodic Block I indicated that among trees species *C. deodara* had maximum and *R. arboreum* had minimum average density, TBA, percentage frequency and IVI.

***Rhododendron arboreum- Quercus leucotrichophora* mixed**

The physical characteristics of the community have been presented in Table 1. This community has been represented in only 1 site.

Community and structure: A total of 17 species (trees: 8;) were recorded in this community. Total tree density and total basal area were 1060.0 Ind ha⁻¹ and 273.8 m² ha⁻¹, respectively (Table 2, 3). *Q. leucotrichophora* (Density: 390 Ind ha⁻¹, TBA: 81.00 m² ha⁻¹ and IVI: 91.37) was the dominant tree and associated by *R. arboreum* (Density: 290 Ind ha⁻¹, TBA: 110.9 m² ha⁻¹ and IVI: 92.87) and *C. deodara* (Density: 140 Ind ha⁻¹, TBA: 71.19 m² ha⁻¹ and IVI: 56.7). Similar results were observed by Kumar (2012) in mixed forest in Garhwal Himalayas where *Lyonia ovalifolia*, *R. arboreum* and *Q. leucotrichophora* were the predominant tree species. However, these results are in contradiction with Giri *et al.* (2008) in relation to the tree density and Upreti (1982) in TBA of *Q. leucotrichophora*.

Species diversity (H')

Community wise diversity of trees are shown in Table 5. Diversity of trees ranged from 0.58-1.89. The diversity of trees was maximum in *C. deodara-P. wallichiana* mixed community (1.89), followed by

C. deodara- R. arboreum- mixed (1.87) and *R. arboreum- Q. leucotrichophora* mixed (1.64) communities. Results are comparable with Pant and Samant (2007) where species diversity in Mornaula Reserve Forest in case of trees ranged from 0.99-2.93.

Numerous studies are available on species diversity in temperate Himalaya (Saxena and Singh, 1982, Tripathi *et al.* 1987, Rikhari *et al.* 1989; Tripathi *et al.*, 1991, Giri *et al.*, 2008). The increased disturbance intensity may favor higher natality and survival of seedling. Particularly, anthropogenic disturbance first decrease the tree diversity with increasing intensity of disturbance decreased trees and sapling diversity and increased seedling diversity. The diversity of disturbance decreased the overall richness and diversity of the ecosystem.

Concentration of dominance (cd)

Community wise concentration of dominance of trees are shown in Table 5. Concentration of dominance of trees ranged from 0.20-0.76. Concentration of dominance of trees was maximum in *P. roxburghii* community (0.76), followed by *P. roxburghii- Q. leucotrichophora* mixed community (0.51) and *P. roxburghii- R. arboreum* (0.29) communities. However, it was lowest in *C. deodara-P. wallichiana* mixed (0.20) community. In case of shrubs, maximum *cd* was observed for *R. arboreum-Q. leucotrichophora* mixed (0.43) and minimum in *C. deodara- P. wallichiana* mixed (0.15) community. These results are very close with the findings of Pant and Samant (2007) for Mornaula Reserve Forest. In their study, *cd* of trees ranged from 0.06-0.49, however, *cd* of trees was highest in *Myrica esculenta* community (0.49), followed by *Pinus roxburghii* (0.46) where *cd* of particular species is concerned. These values were comparable to the previous records (Saxena and Singh, 1982, Ralhan *et al.*, 1982).

CONCLUSION

The study provides information on floristic inventory, compositional and structural diversity at community level of species, first time in the selected area. Therefore, there is an immediate need to develop an adequate strategy and action plan for augmentation of natural regeneration and to employ artificial regeneration of the plant species for long term conservation management of habitats, species, and communities.

Results of the present study can be used for development of conservation management and micro planning of this areas and thus, socio-economic development of the inhabitants, in particular and biodiversity of the Himalaya, in general.

Table 1. Community types, their distribution, habitats and major associated species in study sites

Community types	SR	AR (m)	Habitat	Slope (°)	Aspect	Latitude	Longitude	Major associated spp.
<i>Pinus roxburghii</i> – <i>Quercus leucotrichophora</i> mixed	1	1482-1495	D, Deg	45	NE	30° 18.808'N 30° 18.900'N	078° 25.154'E 078° 25.204'E	<i>Pinus roxburghii</i> , <i>Quercus leucotrichophora</i> , <i>Berberis aristata</i> , <i>Rhus parviflora</i> , <i>Rhus cotinus</i>
<i>Pinus roxburghii</i>	6	1525-1791	D, Deg	35-50	NW, NE	30° 18.080'N 30° 18.470'N	078° 25.137'E 078° 25.073'E	<i>Lyonia ovalifolia</i> , <i>Myrica esculenta</i> , <i>Rhododendron arboreum</i> , <i>Berberis aristata</i> , <i>Myrsine Africana</i> , <i>Asparagus adscendens</i>
<i>Pinus roxburghii</i> - <i>Rhododendron arboreum</i> mixed	3	1863-2015	D, SM	30-50	N, NE	30° 18.204'N 30° 18.242'N	078° 25.059'E 078° 25.995'E	<i>Lyonia ovalifolia</i> , <i>Cornus capitata</i> , <i>Cedrus deodara</i> , <i>Myrsine africana</i> , <i>Rubus ellipticus</i> , <i>Indigofera atropurpurea</i> , <i>Pogostemon plectranthoides</i>
<i>Cedrus deodara</i> - <i>Pinus wallichiana</i> mixed	2	1873-2015	M, SM	50-70	N, NW	30° 18.204'N 30° 18.189'N	078° 25.059'E 078° 25.936'E	<i>Rhododendron arboreum</i> , <i>Pinus roxburghii</i> , <i>Populus ciliata</i> , <i>Rubus ellipticus</i> , <i>Pogostemon plectranthoides</i> , <i>Rubus paniculatus</i>
<i>Cedrus deodara</i> - <i>Rhododendron arboreum</i> mixed	3	1928-2116	SM	60-50	NW, NW	30° 18.101'N 30° 17.893'N	078° 25.145'E 078° 25.004'E	<i>Lyonia ovalifolia</i> , <i>Pinus roxburghii</i> , <i>Populus ciliata</i> , <i>Myrsine africana</i> , <i>Rubus ellipticus</i>
<i>Rhododendron arboreum</i> - <i>Quercus leucotrichophora</i> mixed	1	2116-2200	SM	55	NE	30° 17.893'N 30° 17.995'N	078° 25.004'E 078° 25.009'E	<i>Cedrus deodara</i> , <i>Lyonia ovalifolia</i> , <i>Pinus wallichiana</i> , <i>Myrsine africana</i> , <i>Berberis aristata</i>

Table 2. Community wise total density of trees (Ind ha⁻¹) in different forest localities in study area

Species Name	Community types					
	1	2	3	4	5	6
<i>Pinus roxburghii</i>	220.00	228.33	376.70	50.00	140.00	-
<i>Swida macrophylla</i>	-	6.67	-	-	-	-
<i>Lyonia ovalifolia</i>	-	11.67	63.30	20.00	153.30	90.00
<i>Myrica esculenta</i>	-	11.67	46.70	25.00	56.70	10.00
<i>Quercus leucotrichophora</i>	160.00	1.67	-	25.00	60.00	390.00
<i>Rhododendron arboreum</i>	-	3.33	350.00	115.00	516.70	290.00
<i>Cedrus deodara</i>	-	-	56.70	270.00	386.70	140.00
<i>Cornus capitata</i>	-	-	60.00	25.00	10.00	40.00
<i>Populus ciliata</i>	-	-	-	45.00	80.00	-
<i>Pinus wallichiana</i>	-	-	-	190.00	46.70	80.00
<i>Ilex dipyrrena</i>	-	-	-	20.00	16.70	-
<i>Pyrus pashia</i>	-	-	-	10.00	-	20.00
<i>Fraxinus micrantha</i>	-	-	-	-	6.70	-
<i>Symplocos paniculata</i>	-	-	-	-	10.00	-
<i>Symplocos crataegoides</i>	-	-	10.00	-	10.00	-
<i>Trema orientalis</i>	-	-	10.00	-	-	-
<i>Acacia dealbata</i>	-	-	6.70	-	-	-
Total	380.00	263.34	980.10	795.00	1493.30	1060.00

Abbreviations used: 1= *Pinus roxburghii*- *Quercus leucotrichophora* mixed; 2= *Pinus roxburghii*; 3= *Pinus roxburghii*- *Rhododendron arboreum* mixed; 4= *Cedrus deodara*- *Pinus wallichiana* mixed; 5= *Cedrus deodara*- *Rhododendron arboreum* mixed; 6= *Rhododendron arboreum*- *Quercus leucotrichophora* mixed

Table 3. Community wise total basal area (m² ha⁻¹) of trees in different forest localities in study area

Species Name	Community type					
	1	2	3	4	5	6
<i>Pinus roxburghii</i>	174.28	309.85	192.56	11.94	16.32	-
<i>Swida macrophylla</i>	-	0.04	-	-	-	-
<i>Lyonia ovalifolia</i>	-	0.21	1.14	0.14	2.00	1.13
<i>Myrica esculenta</i>	-	0.62	0.76	0.86	0.52	0.01
<i>Quercus leucotrichophora</i>	122.14	0.00	-	0.21	0.14	81.00
<i>Rhododendron arboreum</i>	-	0.01	69.24	35.07	90.69	110.93
<i>Cedrus deodara</i>	-	-	0.81	147.78	141.04	71.19

<i>Cornus capitata</i>	-	-	0.14	0.33	0.01	0.86
<i>Populus ciliata</i>	-	-	-	29.34	5.52	-
<i>Pinus wallichiana</i>	-	-	-	55.41	3.47	8.37
<i>Ilex dipyrena</i>	-	-	-	0.84	0.27	-
<i>Pyrus pashia</i>	-	-	-	0.02	-	0.32
<i>Fraxinus micrantha</i>	-	-	-	-	0.14	-
<i>Symplocos paniculata</i>	-	-	-	-	0.08	-
<i>Symplocos crataegoides</i>	-	-	0.02	-	0.03	-
<i>Trema orientalis</i>	-	-	0.01	-	-	-
<i>Acacia dealbata a</i>	-	-	0.02	-	-	-
Total	296.42	310.74	264.71	281.92	260.23	273.80

Abbreviations used: 1= *Pinus roxburghii- Quercus leucotrichophora* mixed; 2= *Pinus roxburghii*; 3= *Pinus roxburghii- Rhododendron arboreum* mixed; 4= *Cedrus deodara- Pinus wallichiana* mixed; 5= *Cedrus deodara- Rhododendron arboreum* mixed; 6= *Rhododendron arboreum- Quercus leucotrichophora* mixed

Table 4. Community wise Importance Value Index (IVI) in different forest localities in study area

Species Name	Community types					
	1	2	3	4	5	6
<i>Pinus roxburghii</i>	166.69	271.57	140.87	18.74	27.76	-
<i>Swida macrophylla</i>	-	3.59	-	-	-	-
<i>Lyonia ovalifolia</i>	-	8.95	18.88	7.01	20.45	16.40
<i>Myrica esculenta</i>	-	10.60	12.83	7.48	9.17	3.45
<i>Quercus leucotrichophora</i>	133.31	1.79	-	12.10	7.51	91.37
<i>Rhododendron arboreum</i>	-	3.50	99.24	33.45	96.83	92.87
<i>Cedrus deodara</i>	-	-	13.42	127.25	101.85	56.71
<i>Cornus capitata</i>	-	-	7.62	8.10	1.54	11.59
<i>Populus ciliate</i>	-	-	-	14.80	14.89	-
<i>Pinus wallichiana</i>	-	-	-	60.12	8.94	20.60
<i>Ilex dipyrena</i>	-	-	-	8.78	3.63	-
<i>Pyrus pashia</i>	-	-	-	2.18	-	7.00
<i>Fraxinus micrantha</i>	-	-	-	-	2.57	-
<i>Symplocos paniculata</i>	-	-	-	-	2.90	-
<i>Symplocos crataegoides</i>	-	-	2.32	-	1.96	-
<i>Trema orientalis</i>	-	-	2.32	-	-	-
<i>Acacia dealbata a</i>	-	-	2.51	-	-	-
Total	300	300	300	300	300	300

Abbreviations used: 1= *Pinus roxburghii- Quercus leucotrichophora* mixed; 2= *Pinus roxburghii*; 3= *Pinus roxburghii- Rhododendron arboreum* mixed; 4= *Cedrus deodara- Pinus wallichiana* mixed; 5= *Cedrus deodara- Rhododendron arboreum* mixed; 6= *Rhododendron arboreum- Quercus leucotrichophora* mixed

Table 5. Community wise species diversity (H^1) and concentration of dominance (cd) of trees in different forest localities in study area

Community type	Trees Species diversity (H^1)	Trees Concentration of dominance (cd)
<i>Pinus roxburghii - Quercus leucotrichophora</i> mixed	0.68	0.51
<i>Pinus roxburghii</i>	0.58	0.76
<i>Pinus roxburghii- Rhododendron arboreum</i> mixed	1.52	0.29
<i>Cedrus deodara - Pinus wallichiana</i> mixed	1.89	0.20
<i>Cedrus deodara- Rhododendron arboreum</i> mixed	1.87	0.21
<i>Rhododendron arboreum- Quercus leucotrichophora</i> mixed	1.64	0.24
Maximum	1.89	0.76
Minimum	0.58	0.20

Table 6. Diversity, Distribution

S. No.	Species	Alti. Range (m)	Habitat (s)	SR	Life Form
1	Auifoliaceae <i>Ilex dipyrrena</i> Wall.	2116-2116	SM	1	T
2	Cornaceae <i>Cornus capitata</i> Wall. <i>Swida macrophylla</i> (Wallich)	1863-2116	D, Deg, SM	5	T
3	Ericaceae <i>Lyonia ovalifolia</i> (Wall.) Drude. <i>Rhododendron arboreum</i> Sm.	2015-2015 1784-2116	D, Deg D, Deg, SM	1 11	T T
4	Fagaceae <i>Quercus serrata</i> Murray <i>Quercus leucotrichophora</i> A. Camus	1868-1968	D	1	T
5	Mimosaceae <i>Acacia dealbata</i> Link.	1968-1968	SM	1	T
6	Myricaceae <i>Myrica esculenta</i> Hem. Ex Don.	1784-2200	D, Deg	16	T
7	Oleaceae <i>Fraxinus micrantha</i> Lingelsh	2116-2200	SM	1	T
8	Pinaceae <i>Pinus roxburghii</i> Sarg. <i>Pinus wallichiana</i> Jacks <i>Cedrus deodara</i> Roxb. ex D. Don	1482-2915 1871-2116 1863-2200	D, Deg, SM D, Deg, SM D, Deg, SM	14 5 9	T T T
9	Rosaceae <i>Pyrus pashia</i> Buch.-Ham. ex D. Don.	1428-2200	D, Deg, SM	6	T
10	Symplocaceae <i>Symplocos crataegoides</i> Buch – Ham. ex <i>Symplocos paniculata</i> (thumb.) Miq.	1525-2200 1525-1525	D, Deg, SM D, Deg	3 1	T T
11	Salicaceae <i>Populus ciliata</i> Wall	1873-2015	D, Deg, SM	2	T
12	Ulmaceae <i>Trema orientalis</i> (L.) Bl.	1863-1863	D	1	T

Abbreviations used: SM=Shady moist; SR=Site Representation; D=Dry; Dgr=Degraded; T=Tree; S=Shrub.

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